CALIFORNIA DIVISION OF MINES AND GEOLOGY

Fault Evaluation Report FER-24

December 29, 1976

1. Name of fault: San Guillermo fault.

2. Location of fault: San Guillermo and Lockwood Valley 7.5' quadrangles, Ventura County.

3. Reason for evaluation: Part of a 10-year program; zoned in the Ventura County Seismic and Safety Element (Nichols, 1974).

4. List of references:

a) Carman, M.F., Jr., 1964, Geology of the Lockwood Valley Area: California Division of Mines and Geology Special Report 81, 62 p., 4 plates (scale 1" = 875').

b) Dibblee, T.W., Jr., 1949, unpublished geologic mapping of the "Hines Peak" quadrangle, scale 1:62,500.

Remarks: No topo on base map, no roads; streams only.

c) Jennings, C.W., 1975, Fault map of California with locations of volcanoes, thermal springs, and thermal wells: California Division of Mines and Geology, California Geologic Data Map Series, Map no. 1, scale 1:750,000.

d) Jennings, C.W., and Strand, R.G., 1969, Geologic map of California, Los Angeles sheet: California Division of Mines and Geology, scale 1:250,000.

e) Givens, C.R., 1974, Eocene Molluscan biostratigraphy of the Pine Mountain area, Ventura County, California: University of California Publications in Geological Sciences, v. 109, 107 p., geologic map scale 1:48,000.

f) Hartman, D.C., 1957, Geology of the upper Wagon Road Canyon area, southern California: University of California, Los Angeles, unpublished M.A. thesis, 95 p., map scale 1:15,840.

g) Nichols, D.R., October 1974, Surface faulting ~~in General Discussion~~ in Seismic and Safety Elements of the Resources Plan and Program, Ventura County Planning Department, section II, p. 1-35, plate 1.

h) Poynor, W.D., 1960, Geology of the San Guillermo area and its regional correlation, Ventura County, California: unpublished M.A. thesis, University of California, Los Angeles, 119 p.

i) Stanford Geological Survey, 1966, Geology of the Reyes Peak-Wagon Road Canyon area, Ventura County, California: Stanford University, unpublished geologic map, 1:24,000 scale.

j) Vedder, J.G., Dibblee, T.W., Jr., and Brown, R.D., Jr., 1971, Geologic map of the upper Mono Creek-Pine Mountain area, California: U.S. Geological Survey open-file map, scale 1:48,000.

k) Vedder, J.G., Dibblee, T.W., Jr., and Brown, R.D., Jr., 1973, Geologic map of the upper Mono Creek-Pine Mountain area, California showing rock units and structures offset by the Big Pine fault: U.S. Geological Survey, Miscellaneous Geologic Investigation Map I-752, scale 1:48,000.

l) Weber, F.H., Jr., Kiessling, E.W., Sprotte, E.C., Johnson, J.A., Sherburne, R.W., and Cleveland, G.B., 1975 (Preliminary draft of 2/27/76), Seismic hazards study of Ventura County, California: California Division of Mines and Geology, Open File Report 76-5LA, 396 p., 9 plates, map scale 1:48,000.

Other references:

Adams, W.L., 1956, Geology of the Dry Canyon area, northeastern Ventura County, southern California: unpublished M.A. thesis, University of California, Los Angeles, 67 p. Remarks: This thesis is referred to by Crowell (1968) and others and may address the San Guillermo Creek fault. Unfortunately, the Division Library has not been able to obtain a copy of this thesis.

Gazin, C.L., 1930, Geology of the central portion of the Mount Pinos quadrangle, Ventura and Kern Counties: Unpublished (minor) Ph.D. thesis, California Institute of Technology, Pasadena.

Welday, E.E., 1960, Geology of the San Guillermo Mountain area, California: Unpublished M.A. thesis, Pomona College, Pomona, California.

5. Summary of available data:

The San Guillermo fault is zoned as a secondary fault hazard in the Ventura County Seismic and Safety Element (Nichols, 1974). Essentially all of the faults shown on Jennings and Strand (1969) were zoned in the element. Apparently Nichols did not attempt to determine whether the San Guillermo fault was active, potentially active, or inactive.

The earliest available reference on the San Guillermo fault is Dibblee's (1949) unpublished mapping of the "Hines Peak" quadrangle. Dibblee depicts the San Guillermo fault as confined entirely to Juncal Formation (Eocene) and Caliente Formation (Miocene). Part of the fault is shown as buried under Holocene alluvium.

Hartmen (1957, p. 75) notes that the San Guillermo fault is a steeply-dipping "fracture zone". The fault is a high-angle reverse

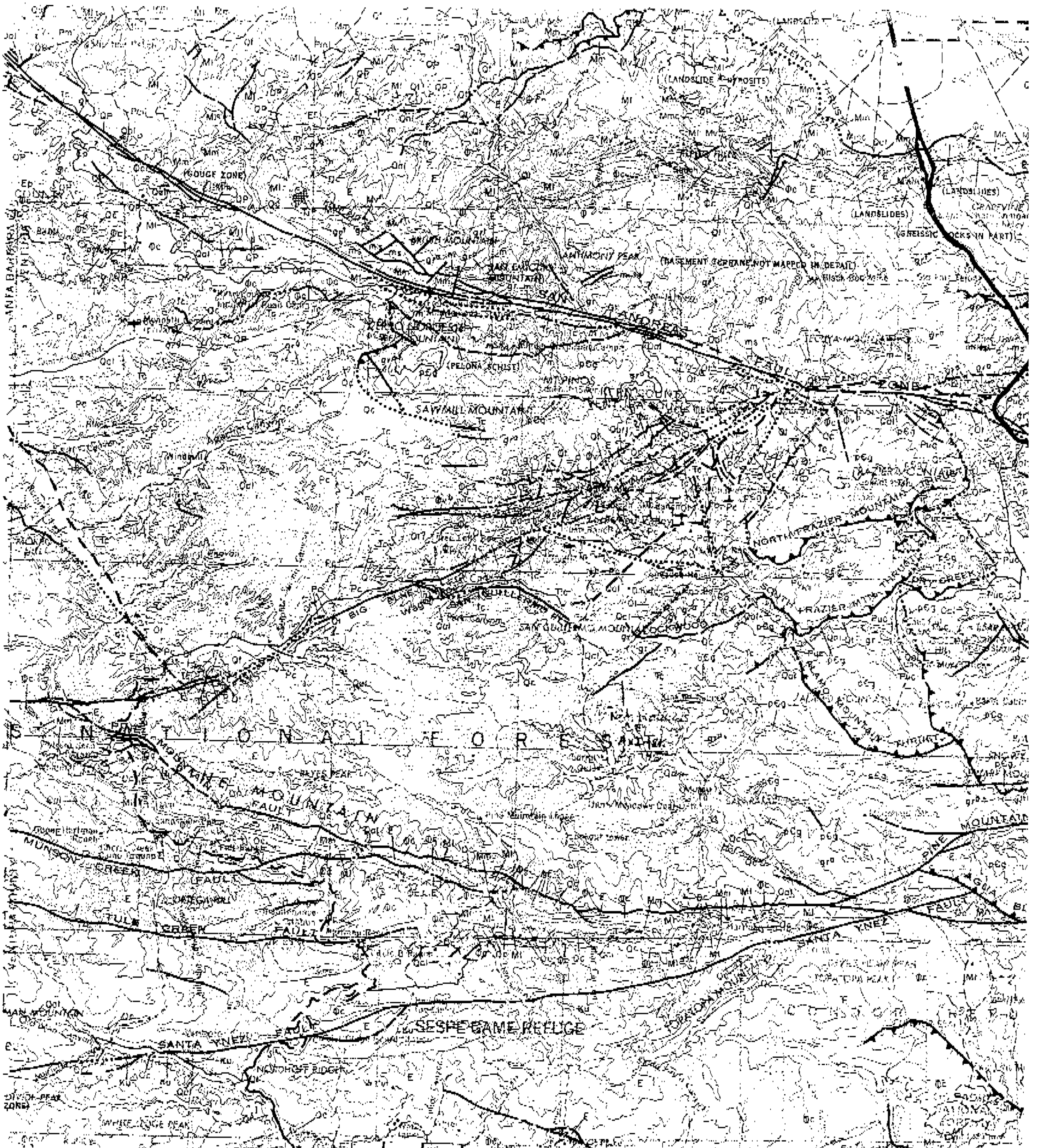

Figure 1: The San Guillermo fault: Regional Geology. (From Jennings and Strand, 1969). Scale 1:250,000.

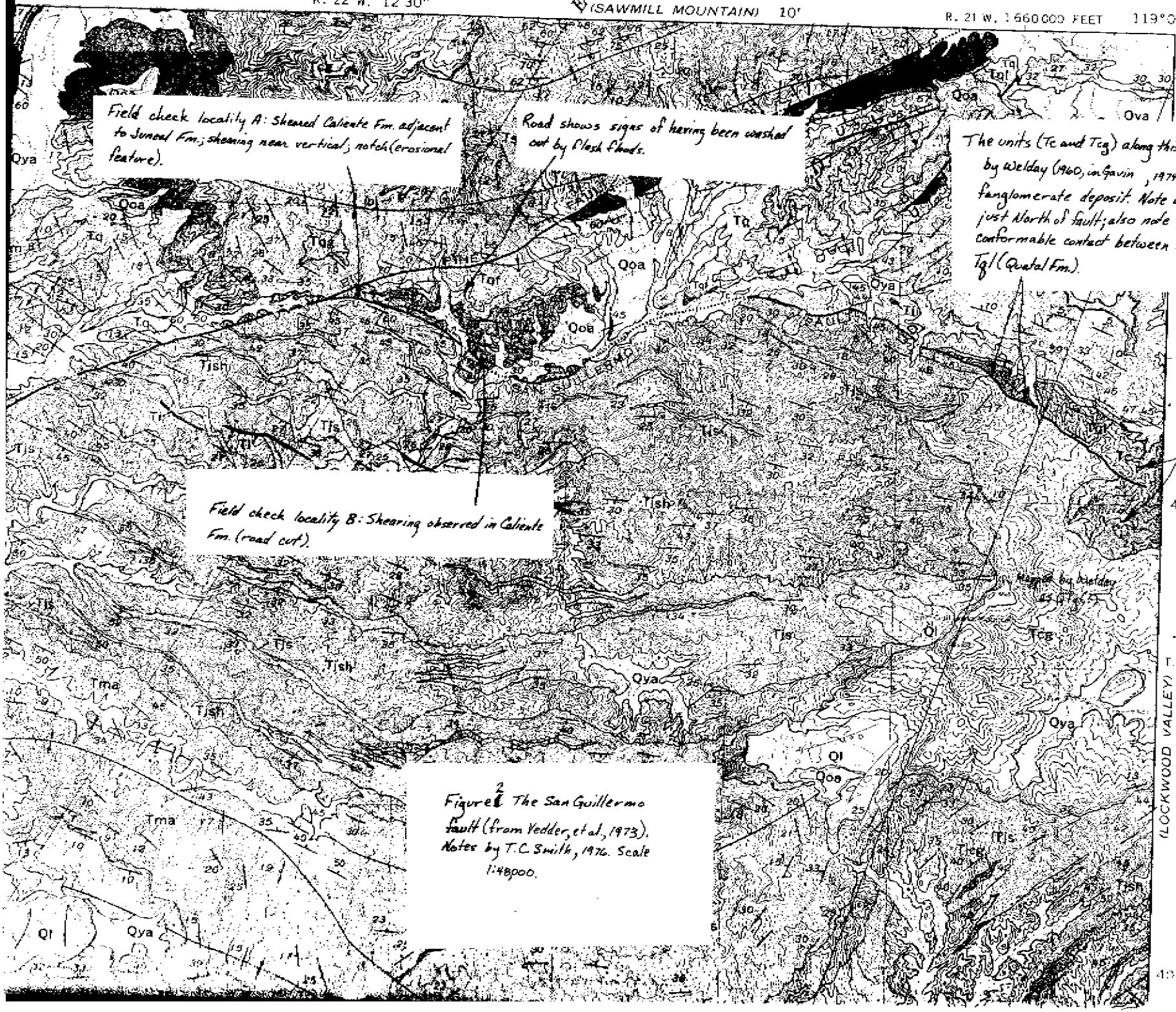

Figure 2. The San Guillermo fault (from Vedder, et al., 1973). Notes by T.C. Smith, 1976. Scale 1:48000.

fault dipping 62° south in some places and vertical in others.

Hartman could make no estimate as to the amount of displacement which had occurred along the fault, but "guessed" that it was 2,500 feet to 4500 feet. He stated that the total displacement "probably predates lateral movement on the Big Pine fault." He notes that there is a "dissected fault-line scarp" along the fault. He states (p. 76) that Gazin (1930) "noted that high-level Pleistocene mesa surfaces cross the fault without dislocation" southeast of his (Hartman's) field area.

Poyner (1960) generally agrees with Hartman as to the sense of and attitude of faulting along the San Guillermo fault. He, however, postulates that the San Guillermo fault was once connected with the Ozena fault; during the time these faults were connected, they were essentially strike-slip faults along which a large, but undeterminable, amount of displacement occurred. The two faults have since been offset by movement along the Big Pine fault. Poyner (p. 63) notes that the youngest unit cut by the San Guillermo fault is Quatal Formation (upper Miocene in age).

Carmen (1964, p. 50) also addressed the San Guillermo fault since its trace crossed a small part of his field area. However, he states nothing more than has already been noted.

The Stanford Geological Survey (1966) mapping depicts the San Guillermo fault as a left-lateral strike-slip fault. The youngest unit cut is Morales Formation (Pliocene). The oldest unit not cut is alluvium (Quaternary).

Vedder, Dibblee, and Brown (1973) depict the San Guillermo fault

as cutting Holocene alluvium (see figure 2). I believe this is a drafting error since 1) nowhere else is the fault mapped as cutting Holocene alluvium; 2) immediately adjacent to this site the fault is shown as buried under Pleiscocene alluvium; and 3) their (1971) open-file map shows the fault as buried at this locality.

Weber, et al. (1975) notes only that the San Guillermo fault is Pliocene or younger.

Jennings (1975) depicts the San Guillermo fault as Quaternary (after Welday (1960) in Givens (1974, p. 6)). Givens notes that Welday notes that a Pleistocene(?) fanglomerate (see figure 1) has been offset, right-laterally, several miles. However, Vedder, et al. (1971, 1973) and Carmen (1974) map these fanglomerates as Caliente Formation (Miocene).

6. Interpretation of air photos: U.S. Department of Agriculture aerial photographs flight AXI 7K, numbers 93-94, scale 1:24,000 were viewed stereoscopically, as were U.S. Geological Survey aerial photos flight WRD 5D6, numbers 7439 to 7443, scale 1:24,000. A general, highly dissected fault-line scarp was noted, but there was no apparent offset of spurs or streams. No tonal or other lineations were noted in the Quaternary units. No features indicative of Holocene or late Quaternary fault activity were noted.

7. Field observations: In light of the data already noted, I did not consider it worthwhile to study the San Guillermo fault in detail. However, I did take the opportunity to observe shearing along the trend of the fault at the two locations (noted on figure 2) on June 22, 1976.

This zone of shearing formed a topographic low, or notch at locality A. In both instances the shears were near vertical, dipping steeply to the south. The streams that cross the fault near each of these localities are subject to frequent flash floods, thus any evidence in these channels would be obliterated within a few years of the creation of such evidence.

8. Conclusions: There is only questionable evidence that the San Guillermo fault has been active during the Quaternary. The Vedder, et al. (1973) reference does show the fault cutting alluvium in one locality, but this is inconsistent with the depiction of the fault elsewhere on the same map. An earlier version shows the fault as buried at this same locality. No evidence of faulting at this locality was noted on aerial photographs; and there is evidence of recent flash floods in a tributary to this creek, thus any evidence of such faulting would probably ~~be~~ have been obliterated within a few years.

Welday (1960, in Givens, 1974, p. 6) states that a Quaternary(?) fanglomerate is offset by the San Guillermo fault. Several others ~~may~~ map these same deposits as continental deposits of the Caliente Formation (Miocene in age). Obviously, someone has misidentified these deposits. Noting the topography, however, one could conclude that if these deposits are Quaternary in age, then the unit must have been deposited during the earliest Quaternary. Looking at the structural geology as mapped by Vedder, et al. (1973), I would question whether this unit could be Quaternary in age, because it appears that Pliocene Quatal Formation is deposited conformably on the unit. (However, I just found out about the Welday (1960) reference, and thus have not yet received a copy to

review.) However, I think it highly unlikely that this unit is Quaternary, and that the San Guillermo fault has moved during the Quaternary.

9. Recommendations: Based on the evidence presented herein, the San Guillermo fault should not be zoned at this time or ever, based on the evidence

10. Investigating geologist's name; date:

Theodore C. Smith
Assistant Geologist
December 30, 1976

cc: C.W. Jennings

I concur with recommendation.
EWH
1/11/77